Notes: Collected Blank Sample`

MW-5

Water Level (ft. toc) – 84.46
Total Depth (ft.) – 240
Air Temperature (°F) – 71.0
Weather Conditions – cloudy, windy
pH - @2 gallons = 10.79, @5 gallons = 11.65, @10 gallons = 11.74
Conductivity (mS) - @2 gallons = 9.26, @5 gallons = 9.87, @10 gallons = 9.91
Temperature (°F) - @2 gallons = 67.1, @5 gallons = 66.3, @10 gallons = 66.7
Sample Time – October 23, 2012/9:09 am
Sample Depth (ft.) – 220
Sample Condition – clear
Notes:

MW-6

Water Level (ft. toc) – 154.20
Total Depth (ft.) – 244
Air Temperature (°F) – 74.5
Weather Conditions – cloudy, windy
pH - @2 gallons = 10.22, @5 gallons = 10.22, @10 gallons = 10.21
Conductivity (mS) - @2 gallons = 2.18, @5 gallons = 2.15, @10 gallons = 2.16
Temperature (°F) - @2 gallons = 69.4, @5 gallons = 68.3, @10 gallons = 68.3
Sample Time – October 22, 2012/10:36 am
Sample Depth (ft.) – 214
Sample Condition – clear
Notes:

MW-7

Water Level (ft. toc) – 117.10
Total Depth (ft.) – 244
Air Temperature (°F) – 71.2
Weather Conditions – cloudy, windy
pH - @2 gallons = 12.06, @5 gallons = 12.20, @10 gallons = 12.18
Conductivity (mS) - @2 gallons = 8.43, @5 gallons = 8.65, @10 gallons = 8.75
Temperature (°F) - @2 gallons = 68.7, @5 gallons = 67.6, @10 gallons = 67.6
Sample Time – October 23, 2012/9:54 am
Sample Depth (ft.) – 219
Sample Condition – clear
Notes:

MW-8

Water Level (ft. toc) – 100.83
Total Depth (ft.) – 190
Air Temperature (°F) – 76.5
Weather Conditions – partly cloudy, windy
pH - @2 gallons = 8.02, @5 gallons = 7.78, @10 gallons = 7.79, @15 gallons = 7.85
Conductivity (mS) - @2 gallons = 12.55, @5 gallons = 10.88, @10 gallons = 10.03, @15 gallons = 9.05
Temperature (°F) - @2 gallons = 73.4, @5 gallons = 71.6, @10 gallons = 71.2, @15 gallons = 72.1
Sample Time – October 23, 2012/11:33 am
Sample Depth (ft.) – 165
Sample Condition – clear
Notes:

MW-9

Water Level (ft. toc) – 84.86
Total Depth (ft.) – 186
Air Temperature (°F) – 81.5
Weather Conditions – partly cloudy, windy
pH - @2 gallons = 7.90, @5 gallons = 7.92, @10 gallons = 9.35, @15 gallons = 11.31
Conductivity (mS) - @2 gallons = 9.61, @5 gallons = 9.91, @10 gallons = 5.61, @15 gallons = 5.36
Temperature (°F) - @2 gallons = 72.5, @5 gallons = 70.7, @10 gallons = 69.9, @15 gallons = 72.6
Sample Time – October 23, 2012/12:31 pm
Sample Depth (ft.) – 161
Sample Condition – clear
Notes:

MW-10

Water Level (ft. toc) – 107.83
Total Depth (ft.) – 254
Air Temperature (°F) – 85.6
Weather Conditions – partly cloudy, windy
pH - @2 gallons = 8.70, @5 gallons = 8.73, @10 gallons = 9.23
Conductivity (mS) - @2 gallons = 6.73, @5 gallons = 5.87, @10 gallons = 4.75
Temperature (°F) - @2 gallons = 74.2, @5 gallons = 71.2, @10 gallons = 69.6
Sample Time – October 23, 2012/13:31 pm
Sample Depth (ft.) – 239

Sample Condition – clear, possible H_2S odor
Notes: Collected Duplicate Sample

MW-11
Water Level (ft. toc) – 67.11
Total Depth (ft.) – 180
Air Temperature (°F) – 85.8
Weather Conditions – partly cloudy, windy
pH - @2 gallons = 9.64, @5 gallons = 9.70, @10 gallons = 9.72
Conductivity (mS) - @2 gallons = 16.47, @5 gallons = 16.04, @10 gallons = 16.03
Temperature (°F) - @2 gallons = 75.5, @5 gallons = 75.5, @10 gallons = 73.2
Sample Time – October 23, 2012/14:55 pm
Sample Depth (ft.) – 155
Sample Condition – silty
Notes:

MW-12
Water Level (ft. toc) – 139.30
Total Depth (ft.) – 210
Air Temperature (°F) – 83.0
Weather Conditions – partly cloudy, windy
pH - @2 gallons = 8.64, @5 gallons = 9.07, @10 gallons = 11.75, @15 gallons = 11.97
Conductivity (mS) - @2 gallons = 13.41, @5 gallons = 9.69, @10 gallons = 6.83, @15 gallons = 7.70
Temperature (°F) - @2 gallons = 74.3, @5 gallons = 71.9, @10 gallons = 70.9, @15 gallons = 69.9
Sample Time – October 23, 2012/15:32 pm
Sample Depth (ft.) – 190
Sample Condition – clear
Notes:

MW-13
Water Level (ft. toc) – 127.23
Total Depth (ft.) – 240
Air Temperature (°F) – 80.2
Weather Conditions – partly cloudy, windy
pH - @2 gallons = 12.11, @5 gallons = 12.09, @10 gallons = 12.10
Conductivity (mS) - @2 gallons = 6.30, @5 gallons = 6.29, @10 gallons = 6.41
Temperature (°F) - @2 gallons = 71.6, @5 gallons = 70.3, @10 gallons = 69.4
Sample Time – October 23, 2012/16:09 pm
Sample Depth (ft.) – 215

Groundwater Analytical Data

Groundwater samples will be collected from the nineteen new monitor wells, prior to Chaparral Energy activities, to characterize the baseline groundwater conditions. The samples were analyzed for chloride by Method 300.0, TDS by Method 2540c, and alkalinity by Method 2320b. Subsequent samples will be collected during future sampling events to assess the effect, if any, of the Chaparral Energy activities. The following table (Table 2) summarizes the laboratory analytical data from this baseline sampling event. The laboratory data is also attached in Appendix C.

Table 2: Groundwater Laboratory Analytical Data

Sample ID	Sample Date	Sample Time	Concentrations, mg/L		
			Chlorides	TDS	Alkalinity
MW-1	10/22/12	14:48	6010	13000	460
MW-2	10/22/12	16:15	1420	3430	286
MW-3	10/22/12	17:08	589	2720	1390
MW-4	10/23/12	08:20	2220	6910	2360
MW-5	10/23/12	09:09	1770	5230	860
MW-6	10/23/12	10:36	387	1230	465
MW-7	10/23/12	09:54	296	2590	1750
MW-8	10/23/12	11:33	2090	4980	352
MW-9	10/23/12	12:31	852	2420	508
MW-10	10/23/12	13:31	1140	2550	60
MW-10 Dup	10/23/12	13:31	1080	2590	56
MW-11	10/23/12	14:55	246	1590	358
MW-12	10/23/12	15:32	616	2810	1310
MW-13	10/23/12	16:09	304	2130	1190
MW-14	10/23/12	17:47	3310	7790	618
MW-15	10/23/12	16:58	3770	7790	238
MW-16	10/24/12	07:45	5490	11700	312
MW-17	10/24/12	09:52	3510	7800	332
MW-18	10/24/12	09:23	286	2620	2020
MW-19	10/24/12	08:35	360	3130	2480
MW-19D	10/24/12	08:35	362	3280	2410
Blank (1)	10/23/12	08:30	<0.16	<35	4
Blank (2)	10/24/12	07:49	<0.16	56	2

This data is strictly presented as baseline data. Data collected from future sampling events will be compared with this data.

Appendix A

GROUNDWATER SAMPLING AND ANALYSIS PLAN

PREPARED BY
ASSOCIATED ENVIRONMENTAL INDUSTRIES, CORP.

FOR
CHAPARRAL ENERGY, OSAGE COUNTY, OKLAHOMA

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GROUNDWATER SAMPLING AND ANALYSIS PLAN
BY
ASSOCIATED ENVIRONEMTAL INDUSTRIES, CORP.
FOR
CHAPARRAL ENERGY, OSAGE COUNTY, OKLAHOMA

1.0 PURPOSE

This plan presents the procedures to be followed for groundwater monitoring well sampling, sample management, and sample custody control at the Chaparral Energy site in Osage County, Oklahoma. Exceptions to these procedures should be recorded in the field notes.

The following personnel will supervise and implement this SAP.

Project Manager	Robert C. Keyes	405-831-9140
QA Manager	Tim Dennis	405-831-9128
Field Supervisor	Danny Jarman	405-831-9162

2.0 SAMPLING PROCEDURES

Activities which will occur during groundwater sampling are summarized as follows:

- pre-arrangement of sample analytical requests with analytical testing laboratory
- assembly and preparation of sampling equipment and supplies
- groundwater sampling
  - determine sample type (i.e. composite or grab), frequency and number of samples, and proper sampling containers
  - inspection of well
  - water-level measurements
  - well depth measurement
  - calculation of purge volume
  - well evacuation
  - sampling
- sample preservation and shipment
  - sample preparation
  - on-site measurement of parameters
  - sample labeling including date, time, location, sampler's initials, analyses, and tracking number
- completion of sample records (field log book)
- completion of chain-of-custody records
- sample shipment

Detailed sampling procedures are presented in the following sections.

2.1 Equipment Assembly and Preparation

Prior to the sampling event, all equipment to be used (listed in Table 1) will be assembled, and its operating condition verified, calibrated, and properly cleaned. In addition, all record-keeping materials will be prepared.

2.1.1 Equipment Check

This activity includes the verification that all equipment is in proper operating condition. Also, arrangements for repair or replacement of any equipment which is inoperative are made.

2.1.2 Equipment Calibration

Where appropriate, equipment will be calibrated according to the manufacturer's specifications prior to field use. Equipment for making on-site measurements are pH, specific conductance, and temperature of water.

2.1.3 Equipment Cleaning (Decontamination)

All portions of sampling and test equipment which will contact the interior well casing will be thoroughly cleaned before use. This includes water-level tapes or probes, pumps, tubing, bailers, lifting line, test equipment for on-site use, and other equipment or portions thereof which are to be immersed. The procedure for equipment cleaning is as follows:

- clean with tap water and phosphate-free laboratory grade detergent, brush if necessary;
- rinse thoroughly with tap water;
- rinse thoroughly with distilled water;
- equipment cleaned prior to field use will be re-cleaned after transfer to the sampling site unless carefully wrapped for transport.

Non-dedicated equipment (such as water level or interface probes) which contacts the interior well casing before evacuation of the casing water should be rinsed thoroughly with distilled water between wells. All other equipment which contacts the interior well casing during or after evacuation of the well casing water should be cleaned between well sampling use in accordance with the above detailed procedures.

Any necessary deviation from these procedures will be documented in the permanent record of the sampling episode.

Laboratory-supplied sample containers will be cleaned and sealed by the laboratory before shipping.

2.2 Groundwater Sampling Procedures

Special care will be exercised to prevent contamination of the groundwater and extracted samples during the sampling activities. The two primary ways in which such contamination can occur are:

- contamination of a sample through contact with improperly cleaned equipment; or
- cross-contamination of the groundwater through insufficient cleaning of equipment between wells. This could occur if non-dedicated sampling equipment is used.

To prevent such contamination, all sampling equipment will be thoroughly cleaned before and between uses at different sampling locations in accordance with Section 2.1.3. In addition to the use of properly cleaned equipment, further precautions will be followed:

- a clean pair of new, disposable latex (or similar) gloves will be worn each time a different well is sampled; and

- sample collection activities will proceed progressively from background area to the downgradient area or from wells which are least affected by contaminants progressively to wells most affected by contaminants (if known).

The following paragraphs present procedures for the several activities which comprise groundwater sample acquisitions. These activities will be performed in the same order as presented below. Exceptions to this procedure will be noted in the permanent sampling record.

2.2.1 Groundwater Level and Well Depth Measurement

Prior to the water-level and well depth measurements, each well will be inspected thoroughly for signs of damage. Any damage to or repairs needed on the well must be noted on the attached Groundwater Sampling Record form, or in the field log book.

Using a pre-cleaned water level meter, the groundwater surface will be measured from the casing datum to the nearest 1/8 inch (0.01 foot). The datum, usually the top of the inner well casing, will be described in monitor well records. A permanent mark or scribe will be visible on inspection of the inner casing. The depth to the bottom of the well must also be measured continually and referenced to the same datum as the water-level measurement. These measurements will be recorded in the field log book. The date and time of the water-level measurements must also be recorded.

2.2.2 Well Casing Evacuation

Typically, the water standing in a well prior to sampling is removed. But do to the extremely low flow nature (~1/4 gpm) of the formation, a low-flow well purge/sampling approach will be used at this site to obtain a representative sample. A grundfos (or similar) pump will be lowered to the center (vertically) of each well screen. The well water will be evacuated at the lowest possible rate of the pump, and approximately 10 gallons of water will be evacuated. A sample will then be collected from the water stream.

During purging/sampling, pH, conductivity, and temperature measurements can be taken and recorded as a check that the water quality in the well has stabilized. A sample will be collected after 5 and 10 gallons of purging for these analyses. All purged groundwater will be containerized in steel 55-gallon drums and managed in accordance with state and federal regulations.

During groundwater collection, no equipment or lifting lines will be allowed to contact the ground. If equipment or lifting lines contacts the ground, they will be replaced or re-cleaned prior to use.

2.2.3 Sample Extraction

A grundfos (or similar) pump will be used to extract water samples from the well. Care must be taken to prevent either the pump or flow line from contacting the ground surface and becoming potentially contaminated during sampling. Care will be taken during insertion of sampling equipment to prevent undue disturbance of water in the well. The pump will be lowered into the water gently to prevent splashing and extracted gently to prevent creation of an excessive turbulence in the well. The sample will be poured directly into appropriate containers. A larger container will be used to allow duplicate samples from each well. While pouring water from the larger container, the water will be carefully poured down the inside of the sample bottle to prevent significant aeration of the sample.

Excess water taken during sampling will be placed in a container for proper disposal.

2.2.4 On-Site Parameter Measurement

Certain chemical and physical parameters in water can change significantly within a short time of sample acquisition. These parameters cannot be accurately measured in a laboratory located more than a few hours from the Facility, and so will be measured on-site with portable equipment. Examples of these parameters are:

- pH;
- specific conductance; and
- temperature;

Measurement of these parameters will be obtained from unfiltered, unpreserved, "fresh" water collected by the same technique as the samples taken for laboratory analyses. The measurements will be made in a clean glass container separate from those intended for laboratory analysis. The measured sample will be disposed of as described in Section 2.2.2. The measured values will be recorded in the field log book.

These water quality indicator parameters will be used to determine well purge volumes to assure the sample is representative of formation water, and not of the stagnant casing water. Stabilized water quality indicator parameter values, after purging of the casing volume, indicate representative formation water.

2.3 Sample Preservation

Water samples will be properly prepared for transportation to the laboratory under refrigeration and chemical preservation, if necessary. The laboratory providing sample containers will have added any necessary chemical preservatives to the sealed containers provided. While in the field, all collected samples must be placed in ice filled chests.

2.4 Container and Labels

Containers and appropriate container lids (Teflon lined) will be provided by the analytical testing laboratory. The containers will be filled and container lids will be tightly closed. All sample container lids will be sealed with tamper proof tape and a label will be firmly attached to the container side (not lid). The following information will be legibly and indelibly written on the label:

- facility name,
- sample identification,
- sampling date,
- sampling time,
- sample collector's initials,
- preservatives used,
- type of sample, and
- analysis to be performed.

2.5 Sample Shipment

Typically, the concentration, volume shipped, and type of compounds present in the groundwater from the Facility are considered by the U.S. Department of Transportation (D.O.T.) to be non-hazardous. Thus, the following packaging and labeling requirements for the sample materials are usually appropriate for shipping the sample to the testing laboratory:

- preserve samples with ice and cool to 4°C,
- package sample so that is does not leak, spill, or vaporize from its packaging;
- label package with
  - sample collector's name, address, and telephone number;
  - laboratory's name, address, and telephone number;
  - description of sample;
  - quantity of sample; and
  - date of shipment;
- attach chain-of-custody forms inside sample shipment container.

2.6 Chain-of-Custody Control

After samples have been obtained, chain-of-custody procedures will be followed to establish a written record concerning sample movement between the sampling site and the testing laboratory. Each shipping container will have a chain-of- custody form completed by the site sampling personnel packing the samples. The chain-of-custody form for each container will be completed in triplicate and sealed in the container. One copy of this form will be maintained with the sampler's company, and the other two copies at the laboratory. One of the laboratory copies will become a part of the permanent record for the sample and will be returned with the sample analyses.

2.7 Sampling Records

To provide complete documentation of sampling, detailed records will be maintained. These records will include the information listed below:

- sample location (facility name);
- sample identification (well number and/or sample number);
- sample location map or detailed sketch;
- sample depth;
- date and time of sampling;
- record field parameters, pH, specific conductance, temp.;
- sampling analysis and method;
- field observations of
  - sample appearance,
  - sample odor
- weather conditions;
- sampler's identification; and
- any other information which is significant.

Groundwater sampling information will be recorded in the field log book.

3.0 ANALYTICAL METHODS

Groundwater samples will be analyzed using the appropriate, EPA-approved methodology in accordance with methods outlined in "Standard Methods for the Examination of Water and Wastewater" or Clean Water Act, Section 304(h), Part 136.

Analytes/Methods/Source of Methods

Chloride/300.0/ Clean Water Act Section 304(h), Part 136

TDS/2540C/ Standard Methods for the Examination of Water and Wastewater

Alkalinity2320b/ Standard Methods for the Examination of Water and Wastewater

The laboratory doing the analyses will have a QA/QC program which specifies procedures and references to be used. As a minimum, the program will contain:

1. Laboratory instrument calibration procedures and schedules.
2. Specification of adherence to accepted test methods.
3. Equipment inspection and servicing schedules.
4. The regular use of standard or spiked sample analyses.
5. Operator or analyst training procedures and schedules.
6. A program of continuous review of results, procedures, and compliance with the QA/QC program.
7. Documentation of compliance with the program.

4.0 DATA EVALUATION AND REPORTING PROCEDURES

Results and conclusions will require the review and assessment of the groundwater monitoring results. Anomalous and unanticipated results may be obtained from the program. Review and assessment activities must, therefore, be able to identify those anomalous occurrences and initiate the proper response to the monitoring results.

Table 1: List of Equipment and Supplies for Monitoring Well Sampling

1. Health and safety equipment required by Site Safety Plan
2. Access keys
3. Logbook
4. Site map
5. Sample location map
6. Chain-of-custody forms
7. Cooler with ice and bubble wrap
8. Disposable vinyl or rubber gloves
9. Distilled or deionized water
10. Liquinox detergent
11. Brushes
12. 5 gallon buckets
13. Visqueen plastic
14. Glass pint jars
15. Trashbags
16. Ziplock bags
17. Paper towels
18. Black ink pens
19. Roll clear tape
20. Garden sprayers or decon unit
21. Tape measure
22. pH meter
23. Specific conductivity meter
24. Water level meter
25. Potable water (for decon)
26. Pump lines

Appendix B

QUALITY ASSURANCE PROJECT PLAN
FOR THE GROUNDWATER SAMPLING AT

CHAPARRAL ENERGY SITE
OSAGE COUNTY
Oklahoma

September 25, 2012

Prepared for:
Chaparral Energy

Prepared by:
Associated Environmental Industries
3205 Bart Conner Drive
Norman, Oklahoma 73072
(405)360-1434

Robert Keyes, Project Manager Date

Tim Dennis, Quality Assurance Manager Date

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1.0 PROJECT DESCRIPTION

1.1 Introduction

This Quality Assurance Project Plan (QAPP) has been developed for the Chaparral Energy site in Osage County, Oklahoma for use in conjunction with the Sampling and Analysis Plan (SAP) and Health and Safety Plan (HASP). These are distinct documents that form the project operations plans intended to guide field personnel, contractors, and other involved parties in all aspects of field operations. This QAPP will provide QA procedures for activities during the sampling performed in accordance with Permit #06S1264P6273.

The United States Environmental Protection Agency (U.S. EPA or EPA) required that the sampling activities be under the control of a centrally managed QA program. This requirement applies to all environmental monitoring activities supported by the EPA. Each contractor that generates data has full responsibility to implement minimum procedures to ensure that precision, accuracy, representativeness, completeness, and comparability of these data are known. To meet this objective, this site specific QAPP has been prepared detailing QA/QC procedures to ensure data generated during the sampling activities are accurate, precise, comparable and complete and therefore, representative of site conditions.

This QAPP will serve as a controlling mechanism during the performance of the sampling and analysis activities to detail procedures to ensure that technical data gathered are accurate, precise, complete, and representative of actual field conditions and meet minimum requirements of the design. All QA/QC procedures will be structured in accordance with applicable technical standards and EPA requirements.

1.2 Site/Facility Description

1.2.1 Location

The site area includes: the SE/4 of Section 10, the S/2 of Section 11, the SW/4 of Section 12, all of Section 14, and the N/2 of Section 23, all in Township 27N, Range 5E, Osage County, Oklahoma; and any subsequently expanded area due to modification of the existing permit areas, which require additional monitor wells.

1.3 Site/Facility History

1.3.1 General History

The site is operating oil field property.

1.4 Project Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements which specify the quality of results required to support decisions made during project activities and are based on the end uses of the data to be collected. As such, different data uses may require different levels of data quality, as described in Section 1.4.3.

For this project, nineteen (19) monitor wells will be sampled for chloride, total dissolved solids (TDS), and alkalinity.

1.4.1 Specific Objectives and Associated Tasks

For this project, it will be necessary to gather sufficient information to characterize and monitor the groundwater quality. The specific tasks to be performed during the monitor well sampling and their associated data collection objectives are as follows:

1.4.1.1 Groundwater Monitoring

Groundwater samples will be collected from nineteen new monitor wells, prior to Chaparral Energy activities, to characterize the baseline groundwater conditions. The samples will be analyzed for chloride by Method 300.0, TDS by Method 2540c, and alkalinity by Method 2320b. Subsequent samples will be collected to assess the effect, if any, of the Chaparral Energy activities.

1.5 Project Schedule

The groundwater sampling activities will require approximately five (5) days to complete.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

2.1 Project Organizational Chart

Section 2.2 details the lines of authority of the Sampling Team for overseeing and implementing the required sampling activities at the Chaparral Energy site in Osage County, Oklahoma. AEI's assigned management team may change during implementation of the sampling. If there is a change in personnel of AEI's management team, the modification will be communicated to U.S. EPA.

2.2 Management Responsibilities

Project Manager, Robert C. Keyes, Associated Environmental Industries

Mr. Robert C. Keyes will have the overall responsibility for ensuring that the sampling activities are implemented and completed in accordance with U.S. EPA guidelines/regulations, and federal, state, and local regulations.

Corporate Health and Safety Officer/QA Manager, Tim Dennis, Associated Environmental Industries

The Corporate Health and Safety Officer will coordinate and provide oversight for the Health and safety issues at the site. He will be responsible for conducting the Health and safety Orientation meeting before the sampling is implemented.

The QA Manager will be responsible for ensuring that all procedures for this project are being followed. In addition, the QA Manager will be responsible for the data validation of all sample results from the analytical laboratory.

Field Manager, Danny Jarman, Associated Environmental Industries.

The Field Manager has overall responsibility for successfully completing the sampling activities at the site. This includes safely completing technical Statement of Work items, fulfilling contractual obligations, compliance with the approved workplan, and meeting all or exceeding the established project schedule and budget. The Project Manager will accomplish these objectives by monitoring the work progress, reviewing and planning each project task with experience technical staff and the Field Project Manager, and ensuring the appropriate and sufficient resources are available to the Field Project Manager and the On-Site QA/QC Officer.

The Field Manager will receive daily progress reports from site personnel appraising him of the status of planned, ongoing, and completed work, including QA/QC performance and health and safety, site-specific issues. In addition, the Field Manager will be apprised of any potential problems and recommendations for solutions and/or corrective action.

2.3 Laboratory Requirements

The laboratory which will be performing sample analysis (except air monitoring) for this project is:

Environmental Testing Inc (ETI)
4619 North Santa Fe
Oklahoma City, OK
Phone (405) 488-2400

Project Manager, Russell Britten

The ETI Project Manager will report directly to the AEI Project Manager and will be responsible for ensuring that all resources of the laboratory are available on an as required basis. He is also responsible for the overview of final analytical reports.

ETI Quality Assurance Officer

The ETI Quality Assurance Officer has the overall responsibility for data after it leaves the laboratory. The ETI QA Officer will communicate data issues through the ETI Project Manager. In addition, the ETI QA Officer will overview laboratory quality assurance and QA documentation, conduct detailed data review, determine whether to implement corrective action, and define appropriate laboratory procedures.

ETI Sample Custodian

The ETI Sample Custodian will report to the ETI Project Manager. The ETI Sample Custodian responsibilities will include: receiving, recording and inspecting the incoming samples; verifying chain-of-custody and its accuracy; notifying laboratory manager and supervisor of sample receipt and inspection; assigning a unique identification number and customer number, and entering each into the sample receiving log; transfer samples to the appropriate lab section.

2.4 Field Responsibilities

On-Site Field Manager, Danny Jarman, Associated Environmental Industries

Mr. Danny Jarman will be responsible for directing all site personnel, equipment, subcontractors, and activities to ensure the successful implementation of the remedial activities. Specific responsibilities of the Field Project Manager will include will include, but not be limited to, the following:

- Supervise field activities and ensuring that the sampling activities are executed in accordance with the SAP;
- Ensure that adequate resources are available on-site to complete required tasks and meet required Performance Standards;
- Ensure AEI associates and qualified subcontractors are properly trained in the safe performance of the tasks which they are assigned;
- Ensure required record keeping and project record documents and other related documents are maintained on-site.
- Assist others in the planning, coordination of field activities and implementation of the sampling activities;
- Communicate with the project manager and the QA manager to remedy problems to ensure agreement on the tasks to be performed each day, and to monitor compliance with the approved SAP and federal, state , and local regulations; and

- In response to modified or unforeseen field conditions, redirecting the sequence of required site work and specifics of work procedures and protocols to accomplish task objectives in the most efficient and safe manner possible.

3.0 QUALITY ASSURANCE (QA) OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective for this project is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results. The purpose of implementing these procedures is to assess the data generated for accuracy, precision, representativeness, completeness, and comparability for both the laboratory analytical program and field sample collection activities. The primary goal of the program is to ensure that the data generated are representative of environmental conditions at the site. To obtain this goal qualitative evaluations will be used to check the quality of the data. Precision, accuracy, representativeness, completeness, and comparability (PARCC) will be assessed in the manner described in the following paragraphs. A qualitative assessment of PARCC factors will be made and will be documented. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventative maintenance of field equipment, and corrective action are described in other sections of this QAPP.

3.1 Precision

The precision of laboratory results and field sampling efforts will be evaluated by examining laboratory and field QC sample results. Analytical precision will be evaluated for analytical methods by comparing the QC criteria stipulated in the standard operating procedures to the results from laboratory matrix spike/matrix spike duplicate samples and field duplicate samples.

3.1.1 Definition

Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions, usually expressed in terms of the standard deviation.

3.1.2 Field Precision Objectives

Field precision is assessed through the collection and measurement of field duplicates at a rate of 1 duplicate per 10 investigative analytical samples.

Precision in the laboratory is assessed through the calculation of relative percent differences (RPD) for replicate samples.

3.2 Accuracy

The accuracy of the analytical data will be assessed by examining the results obtained from the analysis of sample blanks and duplicate samples. One equipment blank will be prepared and documented for every 10 investigative samples. Data will be qualified in accordance with the appropriate EPA functional guidelines for evaluating data if either field QC blanks or laboratory QC blanks indicate that the accuracy or precision of analytical results is compromised.

3.2.1 Definition

Accuracy is the degree of agreement of a measurement with an accepted reference or true value.

3.2.2 Field Accuracy Objectives

Accuracy in the field is assessed through the use of field blanks and adherence to all sample handling, preservation, and holding times.

3.2.3 Laboratory Accuracy Objectives

Laboratory accuracy is assessed through the analysis of matrix spikes (MS) or standard reference materials (SRM) and the determination of percent recoveries. .

3.3 Completeness

3.3.1 Definition

Completeness is the amount of valid data obtained from a measurement system compared to the amount that was expected and needed to be obtained to meet the project data goals.

3.3.2 Field Completeness Objectives

Field completeness is the measurement of the amount of valid measurements obtained from all the measurements taken in the project. The intent of this program is to attempt to achieve a goal of 100 percent completeness. This completeness goal is considered adequate to meet the data quality objectives for this site based on prior consideration of PARCC parameters, the sampling design plans, and data collection activities proposed for each medium. In developing the sampling design plan, critical data points were carefully considered and identified to help ensure comparability of data.

3.3.3 Laboratory Completeness Objectives

Laboratory completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the project. The intent of this program is to attempt to achieve a goal of 100 percent completeness.

3.4 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent environmental conditions and parameter variations at a sampling location. Representativeness is a qualitative parameter most concerned with the proper design of the sampling program. The representativeness criterion is best satisfied by assuring that sampling locations are properly selected and a sufficient number of investigative samples are collected.

3.4.1 Definition

Representativeness is the selection of analytical methods and sampling protocols and locations such that results are representative of the media being sampled and conditions being measured.

3.4.2 Measures to Ensure Representativeness of Field Data

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the field sampling plan is followed and that proper sampling techniques are used.

3.4.3 Measures to Ensure Representativeness of Laboratory Data

Representativeness in the laboratory is ensured by using the proper analytical procedures, meeting sample-holding times, and analyzing and assessing field duplicate samples. The sampling network was designed to provide data representative of facility conditions.

3.5 Comparability

Comparability cannot be ensured through use of standard methods and protocols alone. In order to compare data, various important elements will be considered. During this project, three elements will be evaluated for data comparability. These three elements include analytical methods, quality of data, and sampling design. If after the initial evaluation, data do not appear comparable, the QA Manager will attempt to identify other components possibly affecting comparability, including but not limited to field conditions, sampling protocols, and the occurrence of true data anomalies.

3.5.1 Definition

Comparability is an expression of the confidence with which one data set can be compared to another.

3.5.2 Measures to Ensure Comparability of Field Data

Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the field sampling plan is followed and that proper sampling techniques are used.

3.5.3 Measures to Ensure Comparability of Laboratory Data

Planned analytical data will be comparable when similar sampling and analytical methods are used and documented. Similar QA objectives will be used throughout the project to ensure comparability.

3.6 Level of Quality Control Effort

Field blank, duplicate, and matrix spike samples will be analyzed to assess the quality of data resulting from the field sampling and analytical programs. Field blanks, for water samples, consisting of distilled water used to rinse decontaminated sampling equipment will be submitted to the analytical laboratory to provide a means to assess the quality of the data resulting from the field sampling program. Field blank samples are analyzed to check for procedural contamination at the facility that may cause sample contamination. Field blanks will be collected at a frequency of 1 per 10 water samples.

Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures. Field duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the digestion and measurement methodology. All matrix spikes are performed in duplicate and are hereinafter referred to as MS/MSD samples. One MS/MSD will be analyzed for every 20 or fewer investigative samples per sample matrix. The general level of the QC effort will be one field duplicate for every 10 or fewer investigative samples.

4.0 SAMPLING PROCEDURES

4.1 Analytical Analysis

4.1.1 Analytical Analysis –Groundwater Samples

4.1.1.1 Sample Documentation and Identification

The custody procedures described in Section 5.0 of this QAPP detail the documentation required for groundwater samples, including use of field logbooks, samples labels, and chain-of-custody forms.

Specific sample identification nomenclature for groundwater samples will indicate the groundwater monitoring well number and sampling date (i.e. MW-3/092512). A duplicate sample will be identified by assigning a fictitious well number (e.g., MW-33/092512). The duplicate will be identified in the field logbook as a duplicate sample and the number of the fictitious well.

4.1.1.2 Groundwater Sampling Procedures

Groundwater sampling procedures are described in the SAP.

4.1.1.3 Sample Parameters, Containers, Preservatives, and Volume Requirements

The required sample parameters, containers, preservatives, and volume requirements will be outlined by the laboratory (for chloride, TDS, and alkalinity, one liter glass bottle, unpreserved, stored on ice). The sample containers will meet the requirements given in Specifications and guidance for Contaminant-Free Sample Containers EPA540/R-93/051. Groundwater samples from each well will be analyzed in the field for pH, specific conductance, and temperature. Samples submitted to the laboratory will be analyzed for chlorides, total dissolved solids (TDS), and alkalinity.

4.2 Decontamination Procedures

All sampling equipment will be decontaminated utilizing a triple rinse procedure. During this procedure, the sampling equipment is scrubbed in a potable water/detergent wash (gross rinse), rinsed in potable water (intermediate rinse), and rinsed with distilled water (final rinse). All three decontamination fluids are changed as needed to ensure proper decontamination.

After decontamination, the sampling equipment will be dried with disposable towels and stored in plastic sampling tool boxes between sampling events. All decontaminated equipment within the sampling tool box will be placed in individual plastic bags or wrapped in plastic. The sampling tool boxes will also be decontaminated prior to sampling. All trash and PPE generated during sampling will be placed in designated disposal containers for such items.

4.3 Sample Packaging and Shipment Procedures

Sample containers will be laboratory prepared or purchased from sample supply sources prepared and shipped in sealed containers to assure that they remain clean. Sample containers will be selected to ensure compatibility with the media being collected, preserve sample integrity, and minimize breakage during transportation. Sample labels will be filled out at the time of sampling and will be affixed to each container to identify sample number, sampler's name, date and time of collection, location of sampling point, and project identification data.

After the containers for a given sampling location have been filled out, they will be placed in plastic Ziplock storage bags, on ice, in an insulated cooler, to be delivered to the analytical laboratory. Each sample container will be secured in packing material, as appropriate, for shipment to the designated laboratory. The insulated cooler lid will be taped closed and sealed to avoid the entrance of contaminants into the cooler and to avoid leaking from the cooler. Shipment of samples to the laboratory will take place within the specified holding time(s). The Chain-of-Custody form will be enclosed in a sealed plastic bag and adhered inside the sealed cooler.

5.0 CUSTODY PROCEDURES

Custody is one of several factors which is necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all original laboratory reports, are maintained under document control in a secure area.

A sample or evidence file is under one's custody if:

- the item is in actual possession of a person; or
- the item is in the view of the person after being in actual possession of the person; or
- the item was in actual physical possession but is locked up to prevent tampering; or
- the item is in a designated and identified secure area.

5.1 Field Custody Procedures

Sample identification documents will be carefully prepared to maintain identification and chain-of-custody records and to control sample disposition. Components of the field documentation procedures include the use of field logbooks, sample labels, and the chain-of-custody forms. Original data recorded in field logbooks, chain-of-custody records, and other forms will be written in waterproof ink. The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched.

5.1.1 Field Logbook Records

A field log of daily activities will be used to record sampling activities on a daily basis. This book will be bound and have consecutively numbered pages. Entries in the field logbook will be made in ink and will include: the name of the author; date and time of entry; location of activity; names and affiliations of personnel on site; sample collection or measurement methods; number of samples collected; daily weather report; sample identification numbers; field observation and comments; sampling depth increment for soils; field measurements; locations of photographs; and any deviations from the sampling plan. Each logbook will be assigned a project specific document number. The field log book will be stored in the job trailer when it is not in use.

5.1.2 Sample Labels

Sample labels are necessary to prevent misidentification of samples. Labels will be provided prior to the sampling activities. Each label will contain space for the following information: name of site, sample identification, date and time of sample collection, media sampled, name of sampler, preservatives, and types of analyses to be performed. Chain-of-Custody Records

A Chain-of-Custody (COC) form will be completed to record the custody of every sample collected. A

COC form will accompany every shipment of samples to the analytical laboratory in order to establish the documentation necessary to trace sample possession from the time of sample collection through sample analysis.

The sample portion of the COC form will include the following:

- Project number, name and location;
- Sample identification;
- Name of Project Manager, Sampler, and Recorder;
- Sampling information (sampling area, depth, media type, type of sample, date and time of collection, etc.)
- Analysis to be performed;
- Preservatives used, if any; and
- Signatures of persons involved in the COC possession, including dates.

When a Chain-of-Custody form is filled out, one page of the three-part form is retained and placed in a file at the on-site office. The other two parts of the form accompany the sample to the laboratory. One of those pages is retained by the laboratory and the other is returned with the sample result report. When the sample report is received, it is cross-checked with the COC file record and both COC pages and the laboratory report are placed in a file in fireproof storage at the on-site office. The analytical result is also entered into a computer database consisting of a comprehensive list of all samples taken at the site and the analytical results.

5.2 Laboratory Custody Procedures

Samples, which are delivered by clients or received by courier, are placed in a secure Sample Control Area immediately upon delivery. Coolers containing samples are unpacked within ½ hour of receipt or placed in the walk-in cooler until unpacked. The COC accompanying the samples will be signed by the Sample Custodian or their designee at the time of delivery by the client, or in the case of courier delivery, where the COC is sealed up inside of the cooler, at the time of unpacking.

At the time of arrival and/or unpacking, coolers will be inspected for evidence of damage. They will be unpacked carefully and samples will be organized on the lab bench in numerical order or by sample sets and assigned a laboratory job number. The condition of both shipping containers and sample containers will be recorded on the COC form.

Information on the COC shipped with samples will be verified and recorded as to agreement or non-agreement. Labels will be checked for notation of proper preservation. If there is an apparent non-agreement in the document or incorrect preservation noted, the apparent problem will be recorded and the Project Manager notified. The samples will then be marked or labeled with laboratory sample numbers. Laboratory project numbers are assigned serially, with each sample numbered as a subset of the project number. Finally, samples will be placed in appropriate storage and/or secure areas.

6.0 CALIBRATION PROCEDURES AND FREQUENCY

Procedures described in this section pertain to the calibration, maintenance, and operation of equipment and instrumentation to be used during the implementation of the remedial action. A variety of instruments, equipment, and sampling tools may be used to collect data and samples to monitor site conditions. Proper calibration, maintenance, and use of instruments and equipment is imperative to ensure the quality of all data collected. A record of calibration and maintenance activities is important to provide legally dependable data.

Instruments and equipment used to gather, generate or measure environmental and physical testing data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility are consistent with the manufacturer's specifications.

6.1 Field Instrument Calibration

All instruments and equipment purchased or used for the sampling will be inspected to ensure that the item meets and performs to manufacturer's specifications and project specifications. Instruments meeting these requirements are issued to a field technician trained in instrument operation and made available for site use. All field equipment will be calibrated in accordance with manufacturer recommendations.

A record of the instrument calibration will be maintained in a bound field notebook and these records will be subject to a QA audit. Information recorded will include the following:

- Date of calibration
- All data pertaining to the calibration procedures Initials of analyst performing calibration
- Adjustments made to equipment prior to and following calibration; and
- Record of equipment failure

Field instruments that will be used during this project include a water level meter and pH/temperature/conductance meter.

Any items found to be inoperable will be taken out of use and a note stating the time and date of this action will be made in the calibration logs. The reason for equipment failure and the time and date of its return to service will also be noted in the logbook. Records produced shall be reviewed, maintained, and filed by the field operators. The Project Manager will audit these records to verify complete adherence to these procedures.

6.2 Laboratory Instrument Calibration

The laboratory instrument calibrations are overseen with the laboratory SOP.

7.0 ANALYTICAL AND MEASUREMENT PROCEDURES

7.1 Field Analytical Procedures

Groundwater
pH
Specific Conductivity
Temperature

7.2 Laboratory Analytical Procedures

Laboratory analytical test procedures include the following:

Groundwater

Monitor Wells: Chloride, total dissolved solids (TDS), and alkalinity

Methods

Chloride	300.0
TDS	2540c
Alkalinity	2320b

8.0 INTERNAL QUALITY CONTROL (QC) CHECKS

Internal QC procedures are designed to ensure and document the overall quality of data. Two types of QC checks will be employed to evaluate the performance of the laboratory's analytical procedures. The QC checks represent the system checks and controlled samples introduced into the sample analysis stream that are used to validate the data and calculate the accuracy and precision of the chemical analysis program.

Project QC checks are accomplished by submitting controlled samples into the laboratory from the field. Two external types of QC samples will be used: blanks and duplicates. A duplicate sample will be collected for every 10 samples per matrix or one duplicate per day, whichever is greater. Any samples submitted as "blind" samples will be noted in the field logbook and given a sample number that does not indicate to the laboratory that the sample is a QC check.

8.1 Field Quality Control Checks

For field analyses, field blanks and duplicates will be used.

8.2 Laboratory Quality Control Checks

Laboratory QC checks are accomplished through the use of system checks and QA/QC samples that are introduced into the same analysis stream. Laboratory system checks and QA/QC samples for inorganics are defined below.

- Calibration Blank - A volume of deionized water.

- Continuing Calibration - Analytical standard run every 10 analytical samples or every two hours, whichever is more frequent, to verify the calibration of the analytical system.

- Instrument Calibration - Analysis of analytical standards for a series of different specified concentrations used to define the quantitative response, linearity, and dynamic range of the instrument to target compounds.

- Preparation Blank - An analytical control that contains deionized water and reagents, carried through the entire analytical procedures. An aqueous method blank is treated with the same reagents as a sample with a water matrix; a solid method blank is treated with the same reagents as a soil sample.

9.0 DATA REDUCTION, VALIDATION AND REPORTING

All data collected will be managed, distributed, and preserved to substantiate and document that data are of known quality and are properly maintained. Technical data will be tracked and validated to monitor the performance of the tasks. An outline of the QC data handling process for data collection, transfer, validation, reduction, reporting, and storage for both field and laboratory QC data is described below. The QA Manager is responsible for these tasks.

9.1 Data Reduction

Data quality and utility depends on many factors, including sampling methods, sampling preparation, analytical methods, quality control, and documentation. Once all physical and chemical data are validated and assembled, these data are further evaluated with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters.

To determine the quantitative statistical significance of chemical data, the following items will be assessed as appropriate:

- Laboratory/field instrumentation, including calibration data, standard methods, and references;
- Proper sample bottle preparation;
- Laboratory analysis detection limits;
- Analysis of laboratory (reagent) blanks at a frequency;
- Analysis of laboratory spikes at a frequency;
- Analysis of field replicates (duplicates or splits) at a frequency;
- Analysis of laboratory replicates (duplicates or splits) at a frequency;
- Presentation of tabulated QC data; and
- QA/QC certification of the laboratory and/or participation in round-robin testing by and/or with EPA accredited agencies.

To evaluate the custody and document control for samples and results, the following items will be documented:

- Field custody noted in field logbook or chain-of-custody documentation available;
- Samples hand-delivered to laboratory or chain-of-custody documentation available;
- Laboratory custody documented by chain-of-custody documentation from either field personnel or shipper;
- Laboratory custody documented through designated laboratory sample custodian with secured sample storage area;
- Sample designation number(s) traceable through entire laboratory monitoring system;
- Field notebooks and all custody documents stored in secure repository or under the control of a document custodian;
- All forms filled out completely in indelible ink without alterations except as initials;
- Identity of sampler; and

- Date of sample collection, shipping, and laboratory analysis.

To determine sample representativeness the following items must be checked:

- Compatibility between appropriate field and laboratory measurements or suitable explanation of discrepancy;
- Analysis within holding time limits suitable for the preservation and analysis methods used;
- Sample storage within suitable temperature, light, and moisture conditions;
- Proper sample containers used;
- Proper sample collection equipment used and properly decontaminated;
- Proper sample preservation;
- Proper laboratory preparation techniques used;
- An evaluation of factors to determine bias screening; and
- Sample site selection criteria to provide representativeness.

To evaluate the field physical data that support the analytical data, the following items will be documented:

- Sampling date and time;
- Sampling personnel;
- Sampling location;
- Physical description of sampling location;
- Sample collection technique;
- Field preparation techniques;
- Visual classification of sample using an accepted classification system;
- A thorough description of the methodology used and a rationale for the use of that methodology;
- Complete documentation of record-keeping practices;
- Field notebook and all custody documents stored in a secure repository or under the control of a document custodian; and
- All forms filled out in indelible ink without alterations except as initialed.

9.1.1 Field Data Reduction Procedures

Temperature, pH, and specific conductance will be transcribed directly from direct read instruments. The information will be entered into the field logbook and checked for transcription errors by the sampling team.

9.1.2 Laboratory Data Reduction Procedures

Reduction procedures in the laboratory will be performed by computer database that will provide printouts of raw data and chromatograms. The information will be evaluated by the bench analyst to ensure proper integration and assignment of various sample constituents. Lab records will note all other information not processed by computer such as reagents, sample preparations, etc.

The department supervisor will review the lab notebook and associated computer printouts to ensure all information is accurate and no errors have occurred. Prior to laboratory release of the data, QA/QC will be performed to assess precision and accuracy requirements of the data have been met.

9.2 Data Validation

Technical data, including field data and results of laboratory sample analyses, will be validated to monitor the performance of the remedial action. The data collection and quality assurance procedures for validating field and laboratory data are described below.

Field precision is assessed through the collection and measurement of field duplicates.

9.2.1 Procedures Used to Validate Field Data

Validation of data obtained from field measurements will be performed by the AEI QA Manager. Such validation will be performed by regularly checking procedures utilized in the field and comparing the data to previous measurements. Data that cannot be validated will also be documented.

Field data requiring validation includes the raw data and supportive documentation generated from field investigations and will include, but is not limited to, the following:

- Field notebooks
- Field investigation daily reports
- Field instrument readings and calibration data sheet;
- Field log borings;
- Sample labels;
- Chain-of-custody forms;
- Sample tracking records;
- Surveying information; and
- Maps.

Field measurements that could affect the quality of the data (such as temperature, pH, conductivity, and water level) will also be validated. Validation of all field data will be performed in terms of meeting DQOs by checking the procedures utilized in the field and comparing the data to previous measurements. The following areas will be addressed during validation:

- Sampling methodology;
- Sample holding times and preservation;
- Field instrument selection and use;
- Field instrument calibration and standardization;
- Field instrument preventative and remedial maintenance;
- Field deviations; and
- Units of measure and reference points from which field data will be measured.

9.2.2 Procedures Used to Validate Lab Data

Under the direction of the Laboratory QA Manager, lab data will be reviewed to ensure that results for samples meet all method-specified criteria. The requirements to be checked in validation are:

- Sample Holding Times
- Calibration
- Blanks
- Matrix Spike/Matrix Spike Duplicate
- Field Duplicate
- Target Compound Identification
- Spectral Interference Check Sample Analysis
- Compound Quantitation and Reported Detection Limits
- System Performance
- Overall Assessment of Data
- Interference Check Sample Analysis
- Laboratory Control Sample Analysis

The laboratory QA Manager will be responsible for assessing data quality and advising appropriate laboratory section supervisors of any data that are "unacceptable" or have notations that would caution the data user to possible unreliability. Data reduction, validation, and reporting by the laboratory will be conducted as follows:

- Raw data produced by the analyst will be turned over to the respective supervisor.
- The supervisor will review the data for attainment of QC criteria as outlined in method protocols and established U.S. EPA methods.
- Upon completion of analytical testing, the ETI Project Manager conducts a final review.
- Upon acceptance of the data by the ETI Project Manager, a computerized report will be generated and sent to the AEI QA Manager.
- The AEI QA Manager will complete a thorough audit of all reports.

9.3 Data Reporting

Data generated during the sampling activities will be appropriately identified, validated, and summarized in reports. The AEI QA Manager will develop a data storage and information system to facilitate and manipulate data for tracking, data calculations, and transfer of data to various forms and reports and transmittal of data into a data storage system. Data packages from the laboratory will be in the form of a data QC package excluding of a sample traffic report and electronic deliverables.

The field reports will include: presentation of results, summaries of field data from field measurements, and field location of sampling points. All other information will be bound in the appendices. The laboratory reports will include at a minimum the following components:

- Report title page;
- Date of issuance;
- Any deviations from the intended analytical strategy;
- Laboratory batch number;

- Project name and number;
- Condition of samples;
- Discussion of holding times;
- Discussion of technical problems or observations;
- Discussion of quality control checks which failed;
- Sample description information;
- Analytical tests assigned;
- Analytical results;
- Quality control reports;
- Description of analytical methodology;
- Description of QC methodology; and
- Signature of Laboratory Project Manager.

Both the field and laboratory reports will contain the following:

- Any changes in the QA Project Plan;
- Significant QA problems, recommended solutions, and results of corrective actions;
- Discussions of whether the QA objectives were met, and the resulting impact on decision making; and
- Limitations on the use of the measurement data.